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PROGRESS REPORT COVERING THE PERIOD 1 FEBRUARY, 1973  
TO 31 MARCH, 1973

URBAN AND REGIONAL PLANNING PROPOSAL NO. Y-10-066-001 SR 196

BREVARD COUNTY PLANNING DEPARTMENT  
TITUSVILLE, FLORIDA

PRINCIPAL INVESTIGATOR:

JOHN W. HANNAH

CO-INVESTIGATORS:

DR. GARLAND L. THOMAS

FERNANDO ESPARZA

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Sioux Falls, SD 57198

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## PERSONNEL

In recognition of his contribution to this program, Fernando Esparza of Kennedy Space Center, is henceforth listed as a co-investigator. He is doing the computer programming, in which effort he is assisted by James J. Millard of Kennedy Space Center.

## DIGITAL ANALYSIS

Programming effort to date has resulted in the development of three computer programs. These programs have been designed to receive as input the MSS data on the computer compatible tapes. They have been made modular in form to facilitate future modification and to provide program growth potential.

(1) The first program that has been developed is a raw data dump program.

It takes the CCT data and provides a printer listing in hexadecimal (hex) form. This hex listing may be requested for any number of contiguous records on a tape. All other records on the tape will be read by the computer and the number of 8-bit bytes contained as well as the record number will be listed. This program's primary function is to provide a look at the actual "raw" data, which may be needed when questionable results arise from any data processing program. It has also been used to verify the specified data formats as well as to provide familiarization with the data formats.

(2) The second program\* has the capability of providing a listing of the MSS data in radiance units ( $\text{mwatts/cm}^2\text{-sr}$ ). Optional listings may

\* Previously reported

be requested to tabulate data grouped by MSS band or to tabulate data on all four bands for each element sensed. The data to be listed may be selected from a specified start scan line to a specified stop scan line and from a given start element to a given stop element for all indicated scan lines.

- (3) The third program has been designed to generate a radiance map for a given band. It has the capability of displaying a maximum of eight different printer characters, where each character and the radiance range which it represents may be specified by program input. A designated sector of the ERTS scene is mapped, where the dimension along the flight line is a (designated) multiple of eighths of a scene and the dimension perpendicular to the flight line is a (designated) multiple of half of a tape.

Optimum use of the mapping program requires the ability to make the optimum division of radiance values, which will vary according to the purpose of the map. Hence, the next program to be developed is one to prepare histograms of the frequencies of occurrence of the various radiance values over the sector of the scene which is under study. The histograms so obtained will then be used to determine the desired division of radiance values. Development of this program is underway.

Preliminary results of the computer mapping of density slicing of band 5 data are encouraging. Little analysis has been made pending development of the histogram program described above, but printouts based on a "best guess" for radiance separations are shown in Figures 1 and 2. Darker shading represents higher radiance.

Points of interest are:

Figure 1:

- |                   |                                    |
|-------------------|------------------------------------|
| 1. Ti-Co Airport  | 9. Kennedy Space Center            |
| 2. Port St. John  | 10. Cape Kennedy Air Force Station |
| 3. Cocoa          | 11. Port Canaveral                 |
| 4. Lake Poinsett  | 12. Cocoa Beach                    |
| 5. Lake Winder    | 13. New residential development    |
| 6. I-95           | 14. Patrick Air Force Base         |
| 7. U. S. 1        | 15. Unincorporated area            |
| 8. Merritt Island | 16. Indian River                   |
|                   | 17. Banana River                   |

Figure 2:

1. Titusville
2. Ti-Co Airport
3. Port St. John
4. I-95
5. U. S. 1
6. Highway 405
7. Railroad causeway
8. Indian River
9. Spoil Islands
10. Beeline Highway (under construction)

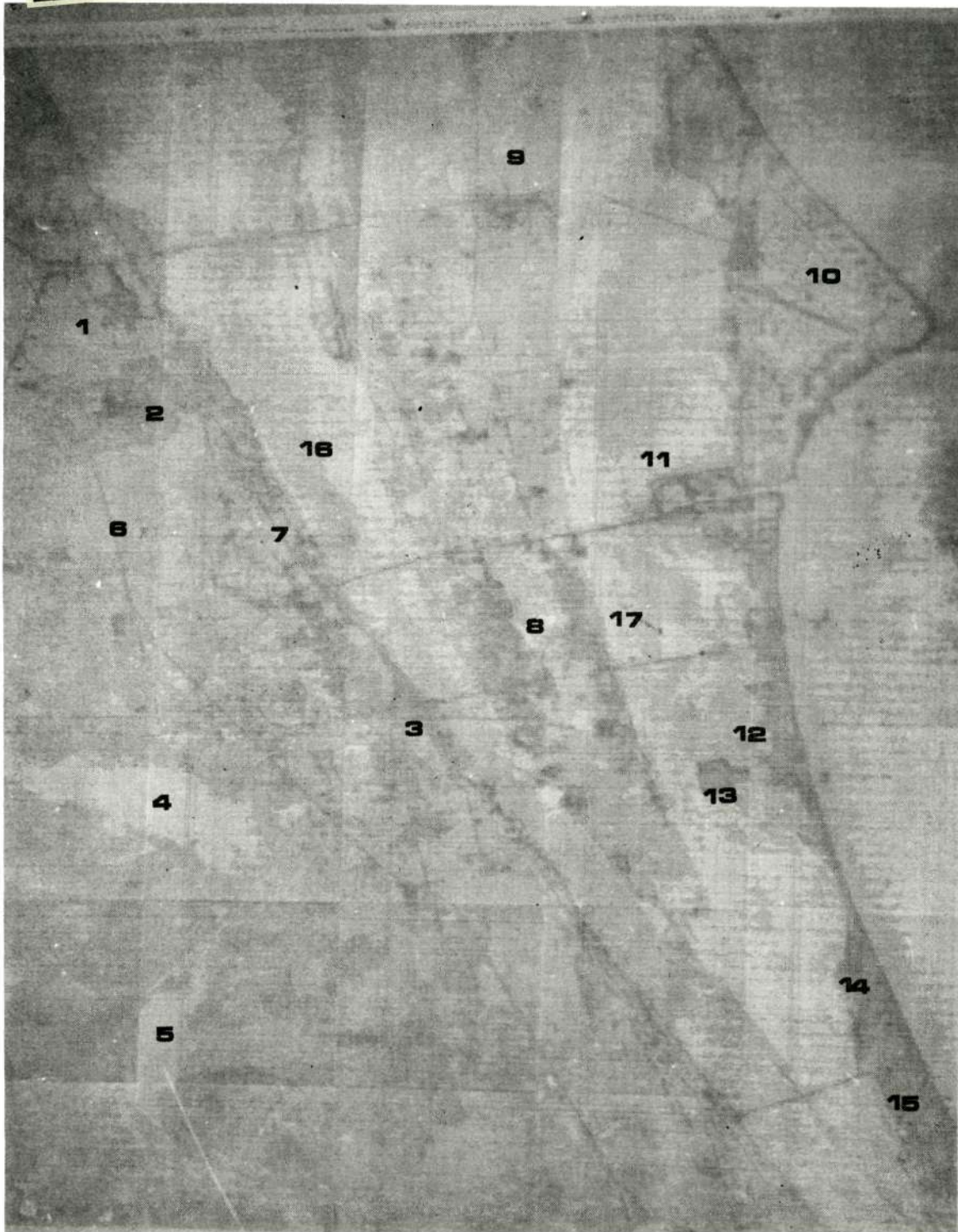


FIGURE #1





FIGURE #2

More dramatic but less informative printouts can be obtained by leaving lower radiance levels blank, as exemplified by Figures 3 and 4.

Items of interest:

Figure 3:

- |                   |                                   |
|-------------------|-----------------------------------|
| 1. Titusville     | 6. Kennedy Space Center           |
| 2. Port St. John  | 7. Cape Kennedy Air Force Station |
| 3. I-95           | 8. Port Canaveral                 |
| 4. U. S. 1        | 9. Indian River                   |
| 5. Merritt Island | 10. Banana River                  |

Figure 4:

1. Highway 405
2. KSC Headquarters area
3. KSC Vehicle Assembly Building
4. Apollo launch pads
5. Indian River
6. Banana River
7. Port Canaveral
8. Atlantic Ocean
9. Highway 528

## CHARACTERISTICS OF CITIES

### Daytona Beach

The method of obtaining city area and relative reflectance from a tracing of the projection of an ERTS image and from the Digicol viewer,



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FIGURE #3

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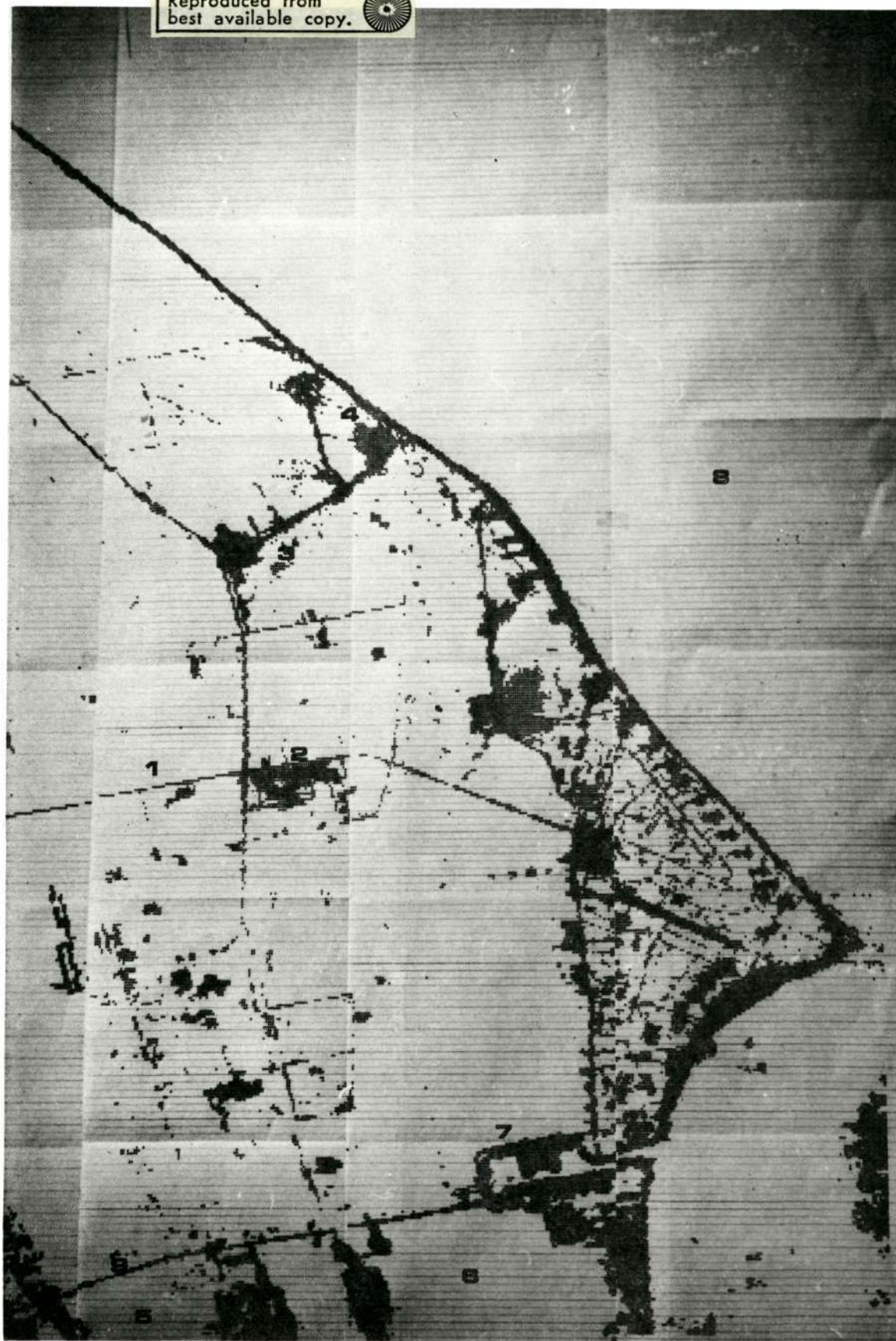


FIGURE #4



as described in the preceding progress report, has been applied to a few more cities. The diagram for Daytona Beach is shown in Figure 5, and the numerical values are added to Table 1. Daytona Beach compares favorably on a basis of the population/integrated reflectance figure. In this and the other diagrams, the numbers give the order of reflectance of the various sectors.

It will be noticed that Daytona Beach follows the development pattern characteristics of the other cities observed so far, namely: (1) development on the beach, (2) development along U. S. Highway 1, (3) central business district near U. S. 1, usually between U. S. 1 and the Indian River, (4) some new development in the vicinities of exits of interstate highways.

#### Florida Shores - Edgewater

Florida Shores is a residential development which comprises a major part of the City of Edgewater. A tracing from an ERTS image projection and a map of the City of Edgewater are included. Housing density of most of Edgewater is sufficiently low that it does not make much impact on the ERTS image, but the Florida Shores pattern as seen on the image closely matches its map.

Florida Shores is different from Port St. John and Deltona in several respects: (1) housing density is relatively low, and the houses are distributed over the entire development rather than concentrated, (2) most of the streets are unpaved, (3) a relatively large amount of vegetation and trees, together with relatively larger than average spacing between houses, gives a more rural atmosphere.

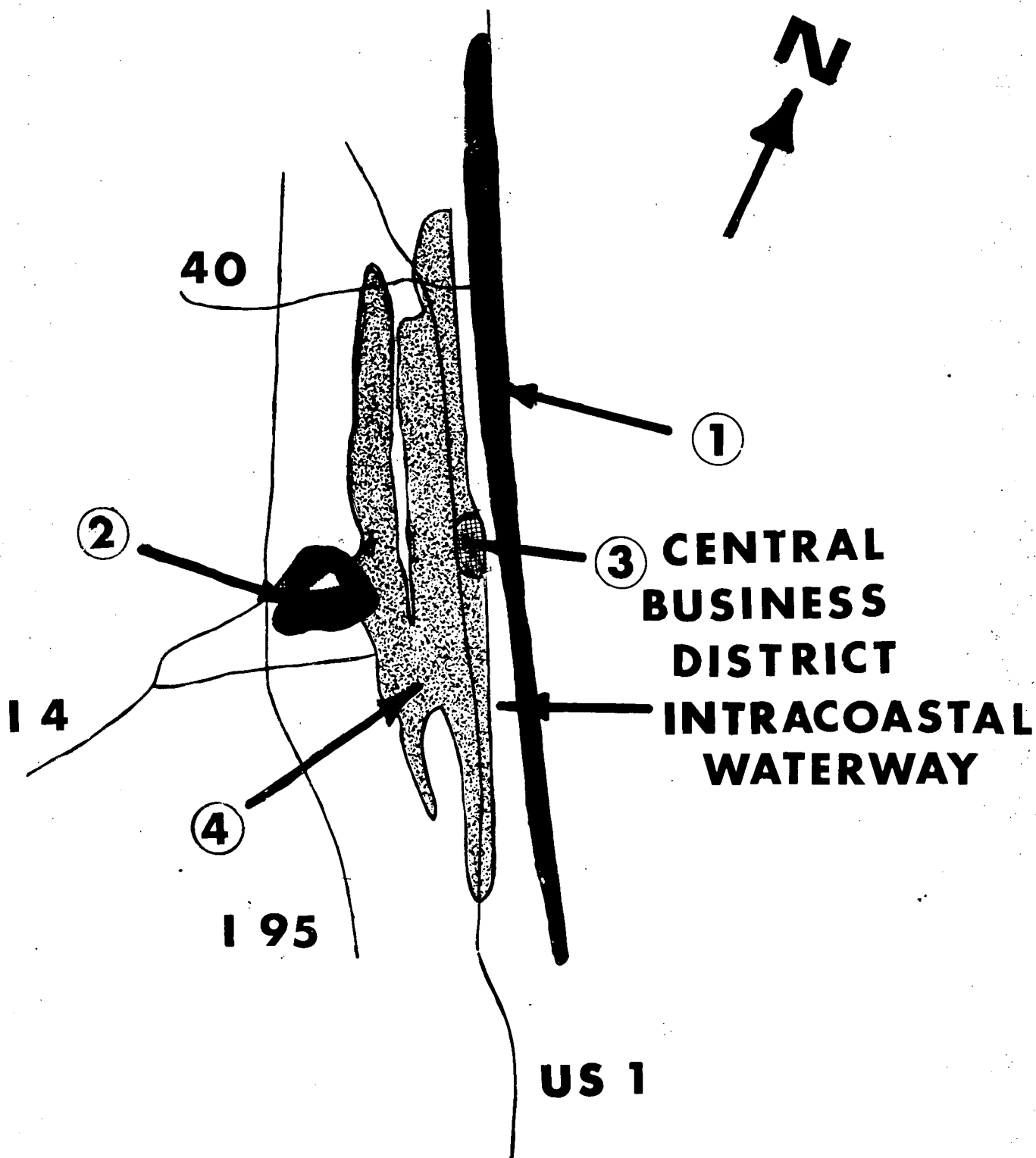
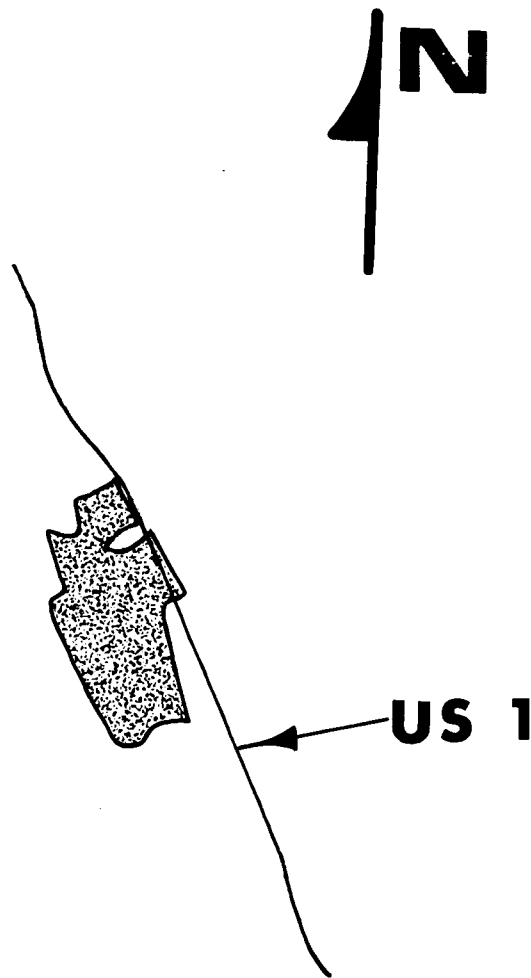


TABLE 1

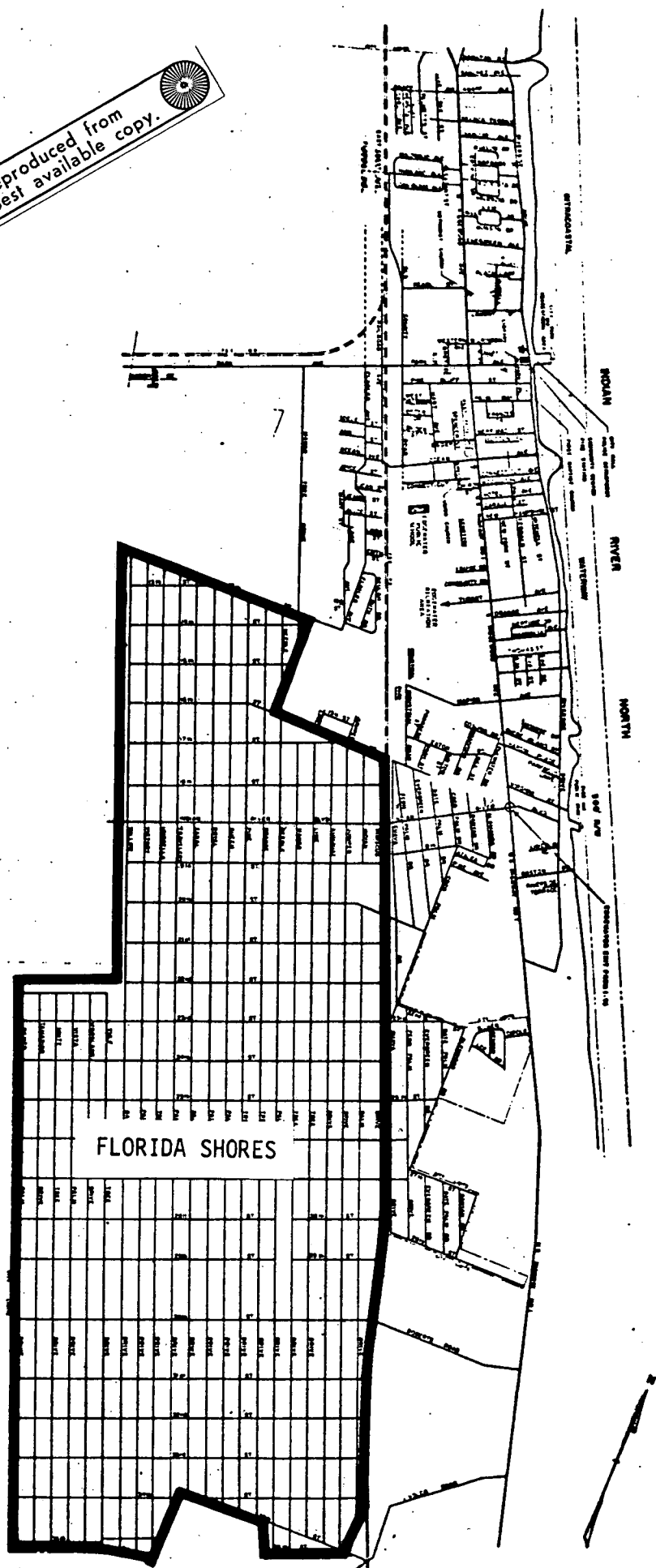
| REGION OR CITY                                     | MAXIMUM<br>RELATIVE<br>REFLECTANCE | INTEGRATED<br>REFLECTANCE | POPULATION  |              | HOUSING UNITS |            | POPULATION                |             |
|--|------------------------------------|---------------------------|-------------|--------------|---------------|------------|---------------------------|-------------|
|  |                                    |                           | AREA        | (persons/ha) | AREA          | (units/ha) | INTEGRATED<br>REFLECTANCE | REFLECTANCE |
| Beach-dune area at<br>New Smyrna Beach             | .83                                |                           |             |              |               |            |                           |             |
| Patrick Air Force Base                             | .65                                |                           |             |              |               |            |                           |             |
| One sector of Orlando                              |                                    |                           |             |              |               |            |                           |             |
| Industrial Area, Cape Kennedy<br>Air Force Station | .58                                | 1076                      |             |              |               |            |                           |             |
| Port St. John                                      | .58                                |                           | Area 2: 6.0 | 2.0          |               |            |                           | 1.6         |
| Deltona  | .60                                |                           | Total : 1.2 | .4           |               |            |                           |             |
| Vehicle Assembly Building,<br>Kennedy Space Center | .54                                |                           |             |              |               |            |                           |             |
| Merritt Island                                     | .49                                | 3933                      | 4.0         |              |               |            |                           | 8.1         |
| Daytona Beach                                      | .49                                | 3910*                     | 7.7*        |              |               |            |                           | 19.8*       |
| Headquarters Area, Kennedy<br>Space Center         | .48                                |                           |             |              |               |            |                           |             |
| Titusville   | .49                                | 1987                      | 6.1         |              |               |            |                           | 15.4        |
| Cocoa  | .48                                | 2090                      | 4.4         |              |               |            |                           | 12.7        |
| Cocoa Beach  | .48                                |                           |             |              |               |            |                           |             |
| Sanford  |                                    |                           | 3.3*        |              |               |            |                           |             |
| McCoy Airport, Orlando                             |                                    |                           |             |              |               |            |                           |             |
| Region south of Patrick Air<br>Force Base          | .41                                |                           |             |              |               |            |                           |             |
| New Smyrna Beach                                   | .39                                |                           |             |              |               |            |                           |             |
| Florida Shores                                     | .38*                               | 318*                      | 3.3*        |              |               |            |                           | 10.5*       |
| DeLand   |                                    |                           |             |              |               |            |                           |             |
| Disney World                                       |                                    |                           |             |              |               |            |                           |             |



# FLORIDA SHORES

FIGURE #6 12

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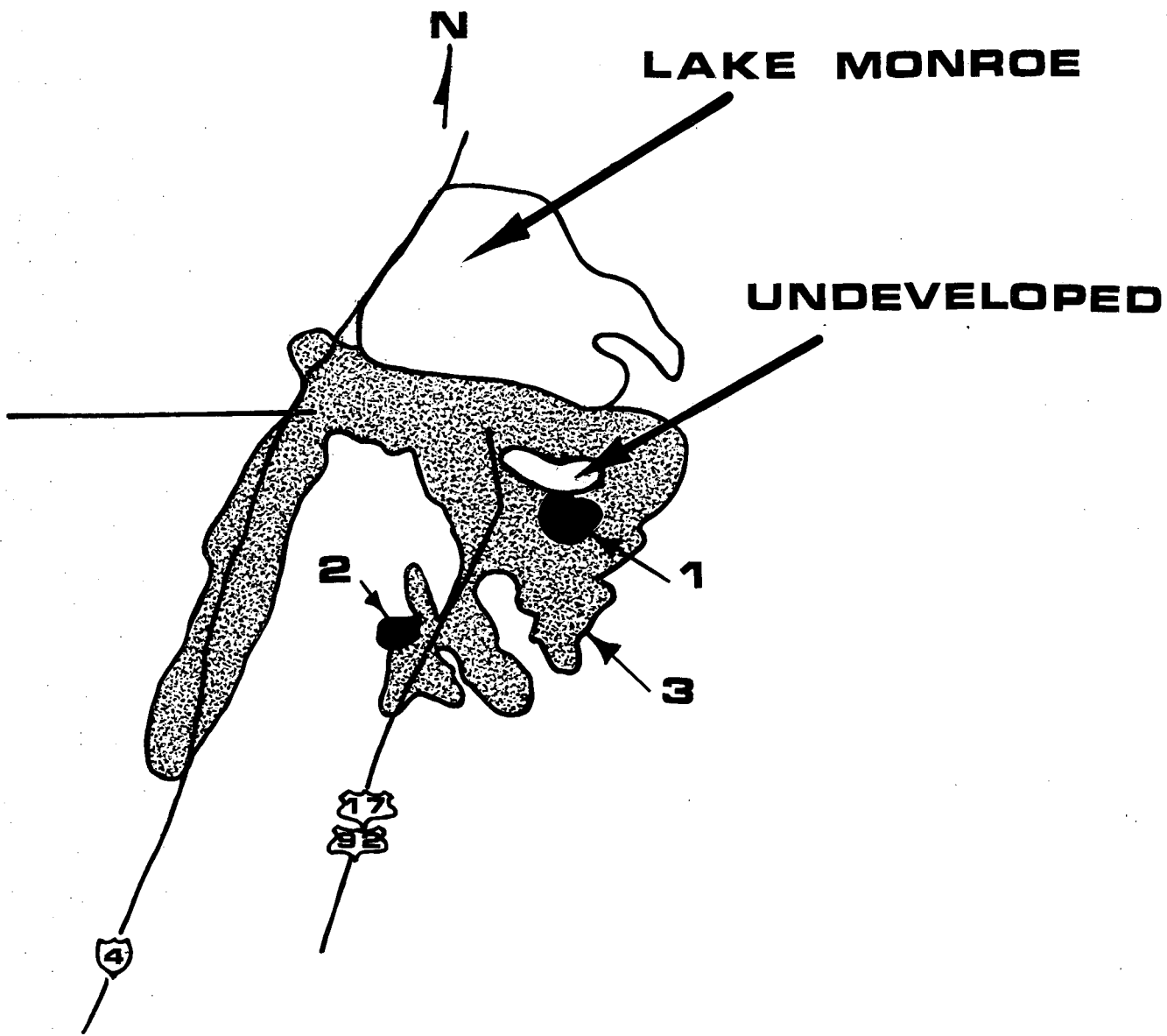
EDGEWATER, FLORIDA

FIGURE #7



### Sanford

The pattern of development of Sanford is shown clearly to be along the major highways and the lake front.



**SANFORD**

FIGURE #8

ABSTRACT

Presented to: Association of American Geographers  
Atlanta, Georgia - April 17, 1973

by: Garland L. Thomas, Ph.D.

Title: Application of ERTS Data to Planning Problems  
(J. W. Hannah, G. L. Thomas and F. Esparza)

An investigation is underway to determine the applicability of ERTS data to urban and regional planning problems, using data for East Central Florida. Small scale land use mapping is feasible. Urban and commercial areas are sufficiently distinguishable that ERTS appears to be a useful tool for monitoring urban and commercial growth. Development patterns of cities, growth patterns of cities, and distribution and changes in certain sectors within cities can be analyzed effectively. Digital analysis methods are proving useful.